PATENT SPECIFICATION

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PROVISIONAL SPECIFICATION

Improvements in and relating to Radio Receivers

[We, E. K. COLE LIMITED, of Ekco Works, Priory Crescent, Southend-on-Sea, Essex, a British Company, and CYRIL LAWRENCE BURNARD, of 36, Winsford Gardens, Westcliff-on-Sea, Essex, a British subject, do hereby declare the nature of this invention to be as follows:—

When a radio receiver is adapted for reproduction of signals on a long and/or medium wave range as well as on a plurality of short wave bands, it is usual to provide an elaborate switching means which often necessitates a plurality of control knobs. The position is further complicated if, in addition to the above, a number of pre-tuned conditions are to be provided to correspond to a similar number of press buttons each individual to a particular station wave length.

The object of the present invention is to provide a receiver in which the circuits for permitting continuous tuning are controlled by a single switch, knob or the like, which also is adapted to condition the receiver for reception under the operation of pre-selected station push buttons.

According to the present invention, a radio received is provided with a single switch which controls the insertion into circuit of ganged condensers of the long and/or medium wave tuning circuits for the pre-selector and oscillator stages and the insertion of a variable tuning inductance for a plurality of short wave bands, together with a plurality of push button switches which for selected long and/or medium wave bands substitute the ganged condenser by pre-set tuning reactances. Preferably the said tuning reactances in the pre-selector circuit are condensers and in the oscillator are inductances.

Another feature of the invention is that padding condensers in the oscillator are used when tuned to medium and/or long waves and wherein when tuning to a short wave band a variable inductance coil is used which gives a substantially uniform change of inductance with a displacement of its magnetic core throughout each particular band.

The invention will be more readily understood by a perusal of the following description of one form which it may take and which is illustrated in the accompanying diagram which shows sufficient of a radio receiver to illustrate the application of the invention thereto.

In the diagram, the aerial circuit (A) is coupled to a pre-selector stage which comprises a medium wave coil L.1, and a long wave coil L.2, both of which are adapted to be tuned by a condenser C.10 which is mechanically connected with a condenser C.11 in the oscillator stage. The insertion into the circuit of one or other of the coils L.1 and L.2 is controlled by a switch (B) which has contacts 1 . . . 10 the connections to which are shown as divorced contacts in the diagram. The pre-selector circuit instead of the coils L.1 and L.2 may be switched to comprise a variable inductance L.3 which is adapted to be shunted by inductances L.4 . . . L.8, so that a corresponding plurality of short wave bands may be accommodated. The coil L.3 is shunted by the condensers C.12 and C.50 between which a lead is taken to the aerial.

Five push buttons P.B.1 . . . P.B.5 whose contacts are shown in the pre-selector as well as in the oscillator stages, are used for selecting any one of five pre-selected stations in the medium and/or long wave bands. The pre-selector circuit is in all cases adapted to be coupled to the input of the triode hexode valve V.1 in the ordinary manner. The oscillator comprised by the triode circuit in the triode hexode V.1 comprises a medium wave oscillator coil L.11 and a long wave oscillator coil L.10 both of which are adapted to be tuned by the condenser C.11 referred to above. The short wave oscillator coil L.12 is adapted to be shunted by any one of the coils L.13 . . . L.17 according to the position of the switch (B) and the coil L.12 is tuned by the condensers C.28 and C.23 whose common terminal is connected to earth. The push buttons P.B.1 . . . P.B.5 control the insertion

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into the oscillator circuit of inductance coils L.18 . . . L.22 to substitute the condenser C.11 when press button tuning is to be effected.

When the switch (B) is on contact (1) the ganged condenser C.10 and C.11 is out of circuit, coils L.3 and L.12 are operative being shunted by coils L.8 and L.13 respectively and tuned by their respective condensers. Coils L.1 and L.2 in the pre-selector network and the corresponding coils L.10 and L.11 in the oscillator circuit are also disconnected, whilst also the master oscillator coil L.9 and the padding condenser in the oscillator circuit are inactive. In this position, the tuning knob is adapted to vary the inductance of coils L.3 and L.12 by varying the position of the magnetic core thereof. In the oscillator stage tracking is effected by an especial construction of the coil L.13 and its core. The coil is of fine gauge wire widely spaced on a former whose diameter is much greater than that of its core, the movement of which is relatively small. It has been found that by this expedient, the linkage of the lines of force of the coil field and the core can be controlled to give substantial linear inductance variation with displacement of the core. This simplifies the problem of tracking, as a constant frequency difference can be maintained between the pre-selector and oscillator tuned circuits without having to employ any form of padding. When the switch (B) is then moved to contact (2) the circuit is substantially the same with the exception that L.7 is substituted for L.8 in the pre-selector stage and L.14 for L.13 in the oscillator stage. Similar modifications are effected by moving the switch (B) to its contact 3, 4, 5 and 6 thus giving six short wave bands over which the receiver may be adapted to receive. At contact 6, coils L.3 and L.12 are operative without shunt coils. When the switch (B) is moved to contact 7, the short wave coils L.3 and L.12 and the associated circuits are disconnected and the ganged condensers C.10 and C.11 are brought, together with the coils L.1 and L.11, into operative connection so that the receiver is then adapted to be tuned to any station in the medium wave range. On moving the switch (B) to contact 8, the coils L.1 and L.11 are substituted respectively by coils L.2 and L.10 and the receiver is adapted for reproduction on any of the long waves. When the switch (B) is moved on to contact 9, the receiver is adapted to be tuned to any of the medium or long wave stations corresponding to the setting of pre-set condensers C.5 . . . C.9 and coils L.18 . . . L.22 on the actuation of the appropriate push buttons P.B.1 . . . P.B.5.

Dated the 23rd day of August, 1945.

ERNEST HEY,
Chartered Patent Agent.

COMPLETE SPECIFICATION

Improvements in and relating to Radio Receivers

We, E. K. COLE LIMITED, of Ekco Works, Priory Crescent, Southend-on-Sea, Essex, a British Company, and CYRIL LAWRENCE BURNARD, of 36, Winsford Gardens, Westcliff-on-Sea, Essex, a British subject, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

When a radio receiver is adapted for reproduction of signals on a long and/or medium wave range as well as on a plurality of short wave bands, it is usual to provide an elaborate switching means which often necessitates a plurality of control knobs. The position is further complicated if, in addition to the above, a number of pre-tuned conditions are to be provided to correspond to a similar number of push buttons each individual to a particular station wave length.

It has however been proposed to adapt a radio receiver for both continuous and push button tuning by means of a wave range switch which was adapted to effect the change-over from automatic to continuous tuning or *vice versa*.

The object of the present invention is to provide an improved arrangement of a receiver in which the circuits for permitting continuous tuning are controlled by a single switch, knob or the like, which also is adapted to condition the receiver for reception under the operation of pre-selected station push buttons.

According to the present invention, a superheterodyne radio receiver is adapted to be conditioned for continuous tuning by a single tuning knob, to long and/or medium waves and in any one of a plurality of short wave bands, and in which the receiver is also adapted alternatively for push button tuning to any one of a number of pre-determined wave lengths in the long and/or medium wave

ranges, and wherein the said alternative conditions of the receiver for continuous or push button tuning are effected by means of a single switch control member which introduces into circuit ganged condensers for continuous tuning in the long and/or medium wave ranges and ganged permeability tuning coils for the short wave bands.

Another feature of the invention is that padding condensers in the oscillator are used when tuned to medium and/or long waves and wherein when tuning to a short wave band a variable inductance coil is used which gives a substantially uniform change of inductance with a displacement of its magnetic core throughout each particular band.

The invention will be more readily understood by a perusal of the following description of one form which it may take and which is illustrated in the diagram which accompanied the Provisional Specification, which shows sufficient of a radio receiver to illustrate the application of the invention thereto.

In the Figure the aerial circuit (A) is coupled to a pre-selector stage which comprises a medium wave coil L.1, and a long wave coil L.2, both of which are adapted to be tuned by a condenser C.10 which is mechanically connected with a condenser C.11 in the oscillator stage. The insertion into the circuit of one or other of the coils L.1 and L.2 is controlled by a switch (B) which has contacts 1 . . . 10 the connections to which are shown as divorced contacts in the diagram. The pre-selector circuit instead of the coils L.1 and L.2 may be switched to comprise a variable inductance L.3 which is adapted to be shunted by inductances L.4 . . . L.8, so that a corresponding plurality of short wave bands may be accommodated. The coil L.3 is shunted by the condensers C.12 and C.50 between which a lead is taken to the aerial.

Five push buttons P.B.1 . . . P.B.5 whose contacts are shown in the pre-selector as well as in the oscillator stages, are used for selecting any one of five pre-selected stations in the medium and/or long wave bands. The pre-selector circuit is in all cases adapted to be coupled to the input of the triode hexode valve V.1 in the ordinary manner. The oscillator comprised by the triode circuit in the triode hexode V.1 comprises a medium wave oscillator coil L.11 and a long wave oscillator coil L.10 both of which are adapted to be tuned by the condenser C.11 referred to above. The short wave oscillator coil L.12 is adapted to be shunted by any one of the coils L.13 . . . L.17 according to the position of the switch (B) and the coil L.12 is tuned by the condensers C.28 and C.23 whose common terminal is connected to earth. The push buttons P.B.1 . . . P.B.5 control the insertion into the oscillator circuit of inductance coils L.18 . . . L.22 to substitute the condenser C.11 when press button tuning is to be effected.

When the switch (B) is on contact (1) the ganged condenser C.10 and C.11 is out of circuit, coils L.3 and L.12 are operative being shunted by coils L.8 and L.13 respectively and tuned by their respective condensers. Coils L.1 and L.2 in the pre-selector network and the corresponding coils L.10 and L.11 in the oscillator circuit are also disconnected, whilst also the load oscillator coil L.9 and the padding condenser in the oscillator circuit are inactive. In this position, the tuning knob is adapted to vary the inductance of coils L.3 and L.12 by varying the position of the magnetic core thereof. In the oscillator stage tracking is effected by an especial construction of the coil L.12 and its core. The coil is of fine gauge wire widely spaced on a former whose diameter is much greater than that of its core, the movement of which is relatively small. It has been found that by this expedient, the linkage of the lines of force of the coil field and the core can be controlled to give substantial linear inductance variation with displacement of the core. This simplifies the problem of tracking, as a constant frequency difference can be maintained between the pre-selector and oscillator tuned circuits without having to employ any form of padding. When the switch (B) is then moved to contact (2) the circuit is substantially the same with the exception that L.7 is substituted for L.8 in the pre-selector stage and L.14 for L.13 in the oscillator stage. Similar modifications are effected by moving the switch (B) to its contacts 3, 4, 5 and 6 thus giving six short wave bands over which the receiver may be adapted to receive. At contact 6, coils L.3 and L.12 are operative without shunt coils. When the switch (B) is moved to contact 7, the short wave coils L.3 and L.12 and the associated circuits are disconnected and the ganged condensers C.10 and C.11 are brought, together with the coils L.1 and L.11, into operative connection so that the receiver is then adapted to be tuned to any station in the medium wave range. On moving the switch (B) to contact 8, the coils L.1 and L.11 are substituted respectively by coils L.2 and L.10 and the receiver is adapted for reproduction on any of the long waves. When the switch (B) is moved on the contact 9, the receiver is adapted to be tuned to any of the medium or long wave stations corresponding to the

setting of pre-set condensers C.5 . . . C.9 and coils L.18 . . . L.22 on the actuation of the appropriate push buttons P.B.1 . . . P.B.5. On moving the switch (B) to its contact 10 the valve V.1 is disconnected from the aerial circuit and the control grid of the valve is connected directly to earth. This enables the low frequency stage of the receiver to be used with a gramophone pick-up and ensures that the H.F. stage of the receiver will be quiet.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A superheterodyne radio receiver adapted to be conditioned for continuous tuning by a single tuning knob, to long and/or medium waves and in any one of a plurality of short wave bands, and in which the receiver is also adapted alternatively for push button tuning to any one of a number of pre-determined wave lengths in the long and/or medium wave ranges, and wherein the said alternative conditions of the receiver for continuous or push button tuning are effected by means of a single switch control member which introduces into circuit ganged condensers for continuous tuning in the long and/or medium wave ranges and ganged permeability tuning coils for the short wave bands.

2. A radio receiver according to claim 1 wherein said member in one position disables the H.F. stage of the receiver thereby conditioning the L.F. stage thereof for reproduction from a gramophone pick-up.

3. A radio receiver according to claim 1 or claim 2 wherein the variable permeability tuned coil of the oscillator is of fine gauge wire widely spaced on a former whose diameter is much greater than that of its core, thereby facilitating "tracking".

4. A radio receiver according to any one of claims 1, 2 and 3, whose tuning arrangements are substantially as herein described with reference to the drawing which accompanied the Provisional Specification.

Dated the 17th day of September, 1946.

ERNEST HEY,
Chartered Patent Agent.

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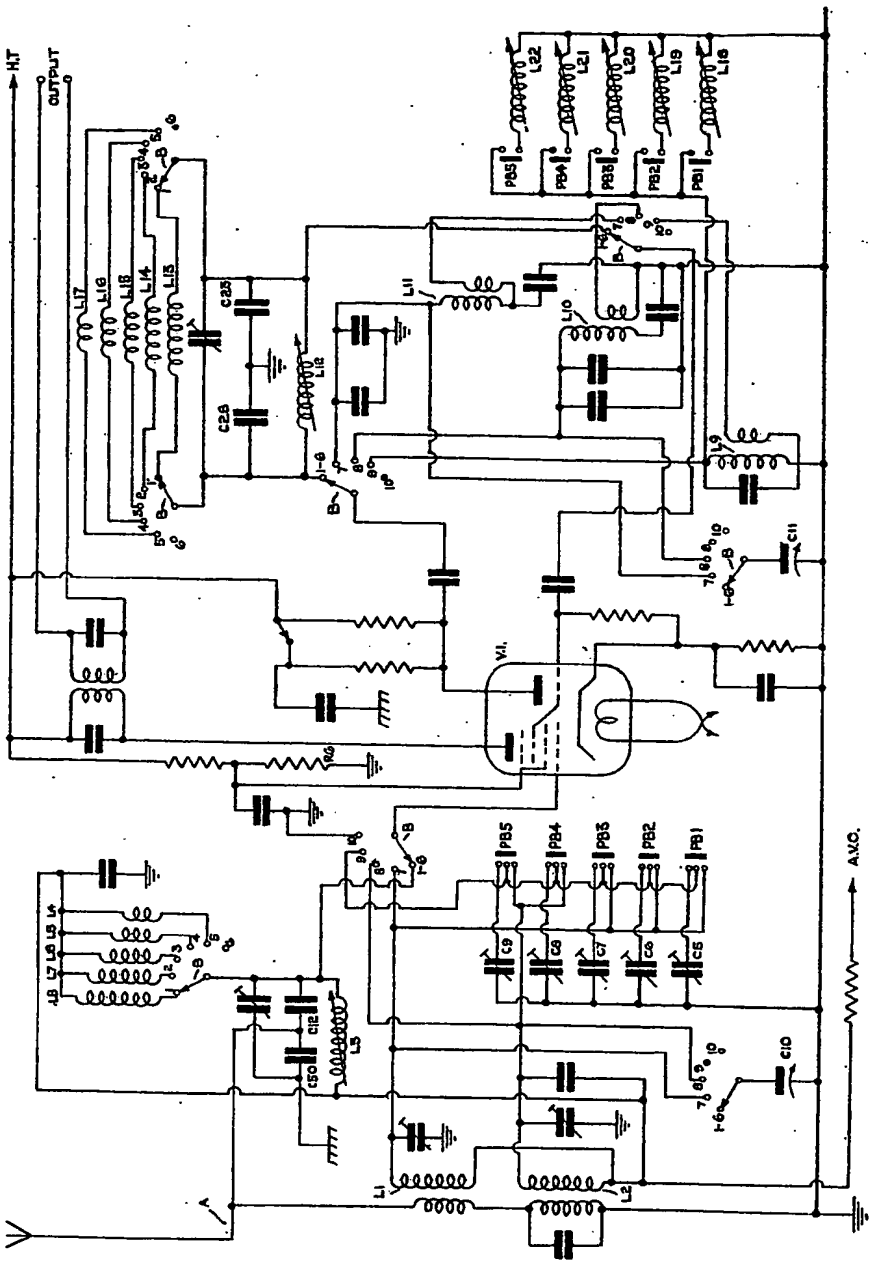

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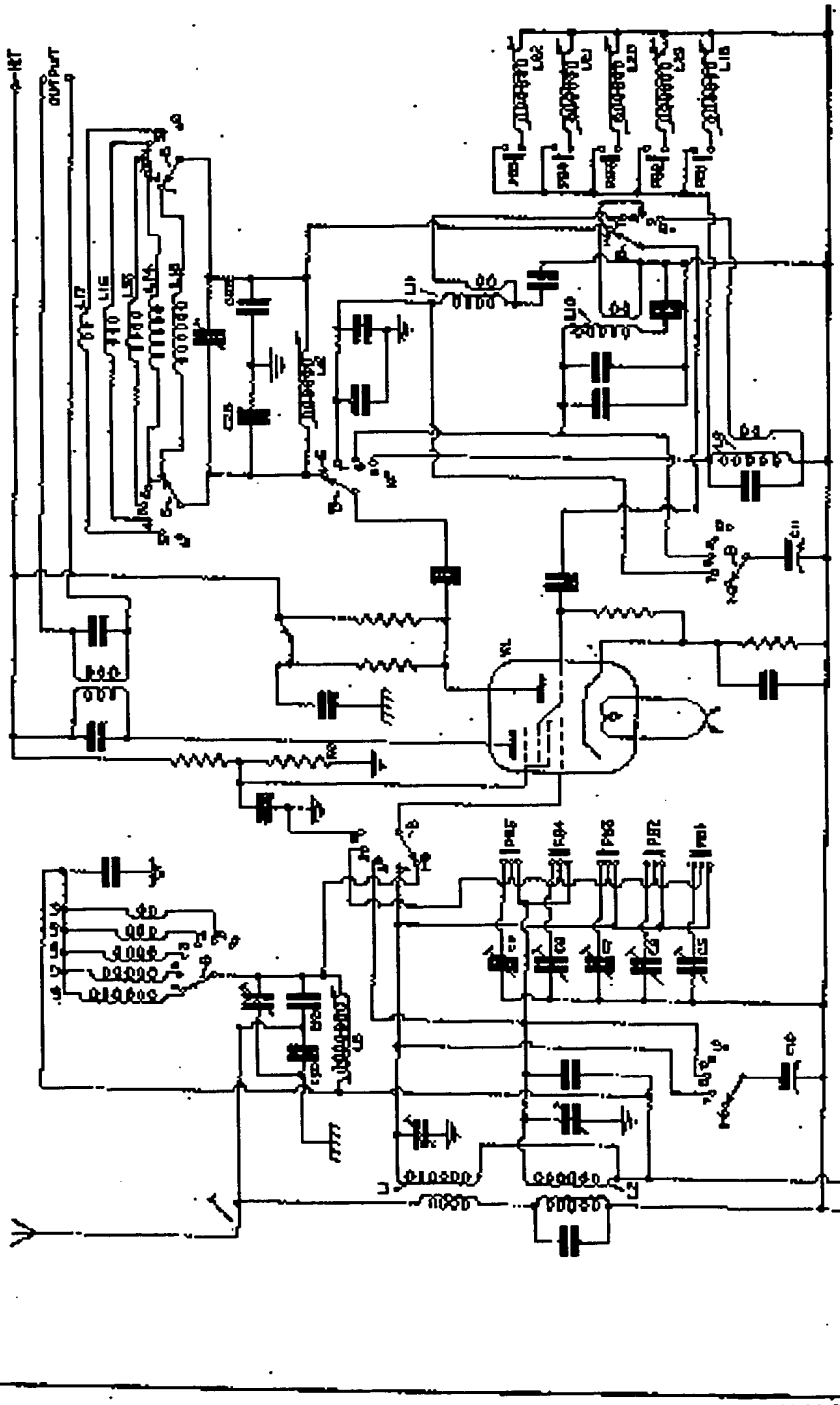

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H.M.S.O. (ly.P.)